

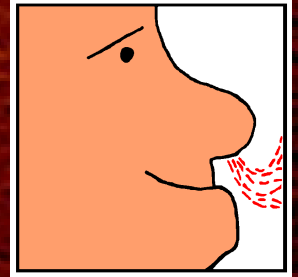
Elements of the Respiratory Protection Program

LG #6

A. Health Hazards of Air Contaminants

Air Contaminants

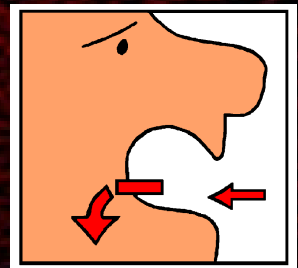
Enter the body through the lungs (inhalation)



May cause illness

★ By direct damage to the lungs

By damage to other body organs as a result of contaminant distribution by the blood



Air Contaminants-- Classifications

▢ Dusts

★ Particles from grinding, sanding, milling, etc.

▢ Mists

▢ Fine liquid particles from spraying

▢ Fumes

▢ Metal particles from welding



Air Contaminants-- Classifications

- ▣ **Vapors**

- ▣ **Evaporation from solvents**

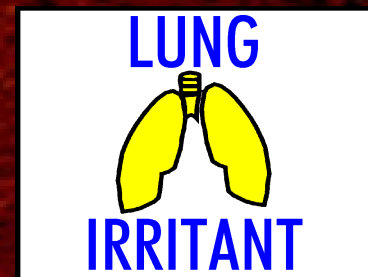
- ▣ **Gases**

- ▣ **Chemical processes and compressed gases**



Air Contaminants-- Characteristics

- Contaminants may be
 - Lighter than air
 - Heavier than air
 - Able to displace oxygen
 - Toxic



B. Engineering Controls

Engineering Controls

- ▢ Used to reduce or dilute air contaminants
- ▢ Common Navy controls include
 - ★ Local exhaust ventilation
 - ▢ Dilution ventilation
 - ▢ Enclosure
 - ▢ Isolation
 - ▢ Substitution



Lack of controls

- ▢ Until engineering controls in place, or no controls available, protection must be applied to the **INDIVIDUAL** instead of the process
- ▢ Respiratory protection used when no other method adequately protects the worker from air contaminants

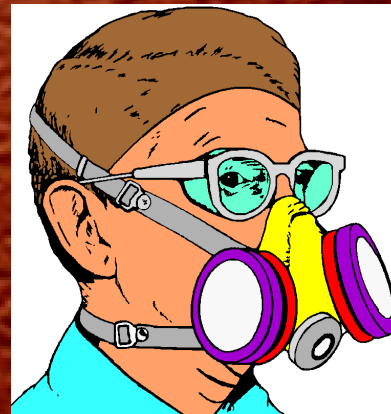
**C. The Navy
Respiratory Protection
Program**

Program Elements

- ❑ Written standard operating procedures (SOP)
- ❑ Proper respirator selection
- ❑ Training for users and supervisors

Program Elements

- ▢ Respirator inspection and maintenance
- ▢ Fit-testing of respirators
- ▢ Cleaning and disinfecting of respirators



Program Elements

- ▣ Proper respirator storage
- ▣ Use of only respirators and components approved by
 - ▣ National Institute of Occupational Safety and Health (NIOSH)
 - ▣ Mine Safety and Health Administration (MSHA)



Program Elements

- ▢ Medical screening of respirator users
- ▢ Periodic program monitoring and evaluation
- ▢ Surveys to determine operations where respirators required
 - ▢ Industrial Hygiene (IH) Surveys

Responsibilities

- **Commanding Officer**
 - Must comply with all respiratory program elements
 - Designates Respiratory Protection Manager to oversee program



Responsibilities

- ▢ **Respiratory Protection Manager (RPM)**
 - ▢ **Qualifies within 3 months of assuming position**
 - ▢ **Ensures sufficient supply of NIOSH/MSHA approved respirators, spare parts, & supplies is maintained**

Responsibilities

▢ Respiratory Protection Manager (RPM)

- ★ Bases respirator selection on type and degree of hazard
- ▢ Maintains roster of personnel enrolled in respirator program
- ▢ Conducts respirator fit testing
- ▢ Ensures breathing air meets minimum Grade D requirements

Responsibilities

- ▣ **Respiratory Protection Manager (RPM)**
 - ▣ Establishes central control points for issuing and maintaining respirator equipment
 - ▣ Inspects, cleans, disinfects, stores, maintains, & repairs respirators

Responsibilities

▢ Medical Department Representative (MDR)

- ★ Conducts preplacement and periodic medical evaluation of respirator users

- ▢ Certifies medical qualification of personnel

- ▢ Assists RPM in identifying/evaluating hazards and selecting respirators



Responsibilities

▢ Division Officers

- ★ Ensures personnel performing work requiring respirators are assigned and qualified prior to use of protective equipment
- ▢ Ensures personnel have current fit test & training
- ▢ Provides personnel with required respiratory equipment

Responsibilities

▢ All Hands

- ▢ Inspect respirators before and after each use
- ▢ Perform positive & negative seal checks prior to each use
- ▢ Report malfunctions to supervisor
- ▢ Prevent damage or loss to respiratory equipment

D. Types of Respirators



Air Purifying Respirators (APR)

- ▢ Remove air contaminants by filtering, absorbing, or adsorbing as air passes through a filtering mechanism
 - ★ Chemically absorbs/adsorbs gases and vapors
 - ▢ Physically captures particulates



Air Purifying Respirators (APR)

- ❑ DO NOT SUPPLY AIR!!**
 - ❑ Adequate oxygen must be present for this respirator to be worn.**

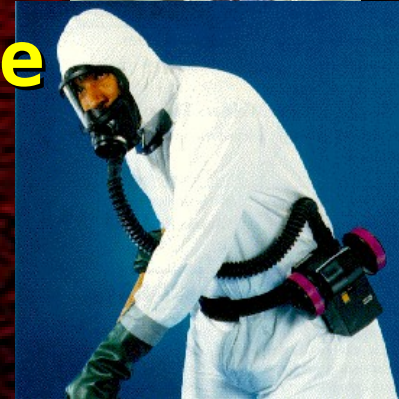
Air Purifying Respirators (APR)

- ▢ Available in half, or full facepiece styles
- ▢ Available non-powered, or powered



Air Purifying Respirators (APR)

- Non-powered--depends on user's lungs to draw air through purifying element during inhalation.
- Powered--equipped with battery which powers fan, forcing air through the filter & keeps positive pressure inside the mask



Air Purifying Respirators (APR)

- Use replaceable cartridges, filter pads, or pre-filters**
- Some available with built-in filters and therefore disposable**

APR-Filtration Elements

- ❑ Cartridges labeled with use and NIOSH "TC" approval number
- ❑ Cartridges are color coded
- ❑ Cartridges designed to remove specific contaminants
- ❑ Filters/pre-filters can be added to a cartridge (paint pre-filters)



APR-Filtration Elements

- ❑ Same manufacturer must make all cartridges, filters, & facepieces for a respirator
- ❑ NIOSH/MSHA approve respirators as a set
- ❑ DO NOT “mix-and-match” respirator components--
ILLEGAL!

APR Cartridges and Filters

- ▢ Based on the warning properties of the contaminants
 - ▢ Detection of the material by smell or irritation



APR Cartridges and Filters

- ▣ Cartridge life depends on
 - ▣ Concentration of the contaminant
 - ▣ User breathing rate and volume
 - ▣ Humidity in the air
 - ▣ Other factors



APR Cartridges and Filters

- Cartridge is exhausted when “breakthrough” occurs
 - ★ Detection of the contaminant through the cartridge
- Lack of warning properties or high toxicity of the material may require higher level of respiratory protection (supplied-air respirator)

Air-Supplying Respirators

▣ Used when:

- ▣ Contaminant has no warning properties
- ▣ Concentrations too high for APR
- ▣ Environment is Immediately Dangerous to Life or Health (IDLH)

▣ Types

- ▣ Airline
- ▣ Self-contained



Breathing Air Requirements

- ▢ Air supplied from Ambient Air Breathing Apparatus (AABA) or from certified LP air source
- ▢ LP air must be tested quarterly
- ▢ Must meet Grade D (minimum) breathing air requirements



Breathing Air Requirements

- ❑ Maximum hose length is 300 feet
- ❑ Equipment NOT interchangeable between manufacturers
(Can't use 3M respirator and MSA hose)



Air-Supply Respirator Types

- Demand--supplies air when user inhales
- Pressure Demand--continuous positive pressure
- Continuous Flow--constant air flow
- Emergency Air Breathing (EAB)--apparatus used on subs

Self-Contained Breathing Apparatus (SCBA)

- Consists of facepiece, hose, regulator, and air source carried by user
- Closed-circuit SCBA-Uses CO_2 scrubber and oxygen tank (exhaled air is re-breathed)



Self-Contained Breathing Apparatus (SCBA)

- Open-circuit SCBA-Uses compressed air tank (exhaled air expelled to outside)
- Emergency Escape Breathing Device (EEBD)-Special type of SCBA used for escape ONLY.



Authorized Respirators for IDLH Atmospheres

- Full-facepiece SCBA operated in pressure-demand mode
- Full-facepiece airline respirator operated in pressure-demand mode, with auxiliary self-contained air tank containing at least 15 minute air supply to allow for escape



NOT!!

- ❑ Surgical masks are NOT respirators
- ❑ OBA's & MCU-2/P gas masks are emergency equipment ONLY--are NOT approved respirators



OBA Guidelines

- ▢ Use OBA to enter IDLH area only when
 - ★ Ship is underway
 - ▢ Required by emergency or operational necessity
 - ▢ Approved by CO

E. Medical Qualification

You Must Be Medically Qualified

- ❑ Medical Dept. will do evaluation
- ❑ Will determine any limitations on use
- ❑ May refer to physician for follow-up



Medical Qualification

- ❑ Some medical problems may prevent wearing respirator
 - ❑ Respiratory, cardiovascular diseases
 - ❑ Physical deformities
 - ❑ Medications
 - ❑ Neurological problems
 - ❑ Psychological conditions



F. Respirator Selection

Evaluating the Hazard

- Evaluation → First step
- Based on IH survey or other estimate by Safety Officer or Supervisor
- Based on potential health hazard, amount of ventilation
- If in doubt--Too much protection better than too little.

Key questions in Evaluation

- Does the contaminant have warning properties?
- Is contaminant absorbed through the skin?
- What is expected concentration of the contaminant?
- Is contaminant/atmosphere IDLH?
- Is there sufficient oxygen in the air?

Match the Respirator to the Hazard

▣ Respiratory protection specific for

★ Dusts

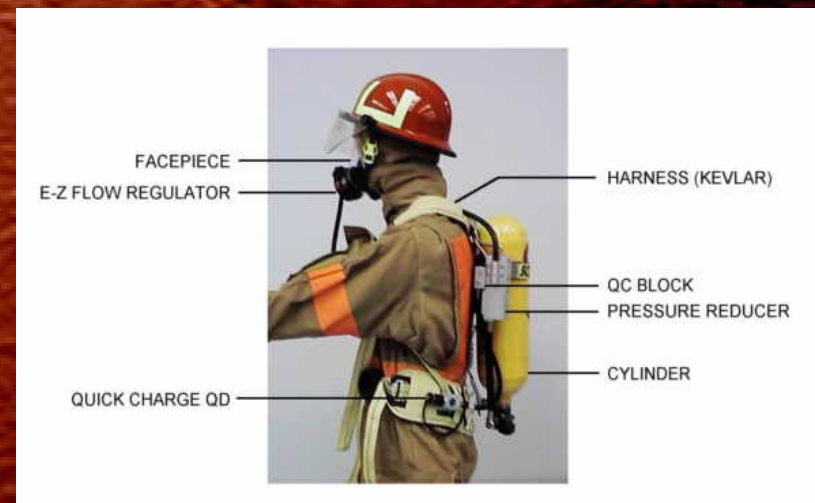
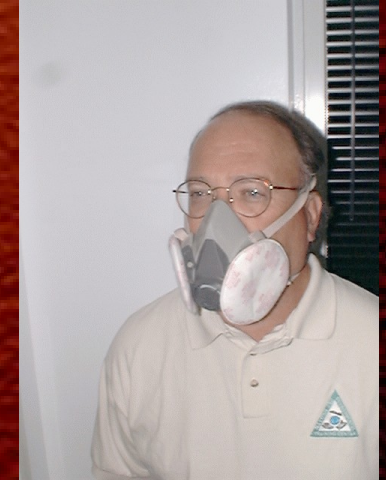
▣ Mists

▣ Fumes

▣ Vapors

▣ Gases

▣ Lack of oxygen



Match the Respirator to the Hazard

- ▢ Selection based on design and rating for specific hazard
- ▢ Respirators must be NIOSH & MSHA approved
 - ★ Look for “TC-” and approval number
- ▢ Ensure parts are not interchanged between manufacturers



G. Respirator Fit- Testing

Fit Testing

- ▢ Respirators exist in variety of styles, shapes, sizes
 - ★ Half and full facepiece respirators come in small, medium, and large sizes
- ▢ Each user must be tested in the mask they will use
- ▢ Fit testing conducted by trained individual to ensure respirator does not leak

Qualitative Fit Testing

- ▢ Required for personnel assigned to use respirator
- ▢ RPM determines need for fit testing
- ▢ Test uses
 - ★ Irritant smoke
 - ▢ Banana oil
 - ▢ Sweet mist (saccharin)
 - ▢ Bitter mist (Bitrex)

Quantitative Fit Testing

- ▢ Performed using probe inserted in respirator
- ▢ Determines quantity of contaminant passing through mask seal
- ▢ Determines “fit factor” based on ratio of contaminant inside mask vs. contaminant outside mask

Quantitative Fit Testing

- ❑ May be required for lead & asbestos work
- ❑ Requested and performed by shore activities



Fit Testing

- ▣ Performed by Medical dept., shore medical facility, local tender/repair ship Safety Officer, NEPMU, or anyone properly trained to do so
- ▣ Must be refitted annually.
- ▣ Semi-annual refit requirement for asbestos and lead

Positive and Negative Fit Checks

- ▢ Required every time respirator is donned.
- ▢ Positive Seal Check
 - ★ Cover exhalation valve and breathe out slightly
- ▢ Negative Seal Check
 - ▢ Cover inhalation valve/cartridge and inhale
- ▢ Mask should not leak around face seal

H. Care of Your Respirator

Cleaning & Maintenance

▢ Inspection

★ All reusable respirators shall be routinely inspected before and after each use

▢ Missing parts renders a respirator useless

Cleaning & Maintenance

□ Cleaning

- ★ Clean and sanitize according to manufacturer's instructions

- Avoid water/air temps above 110° F

- Dirty respirators can spread disease

- Dirt may render the respirator useless

Cleaning & Maintenance

- ▢ Store in zip-lock bag
- ▢ Keep away from heat or strong chemicals
- ▢ If using disposable respirator, dispose of after each use, or clean and store in zip-lock bag if service life not expired
- ▢ PMS available for airline hose masks and AABA's using MIP 6600